

PATENT

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Filed : October 30, 2001

For : METHODS AND APPARATUS FOR PROCESSING THE  
SURFACE OF A MICROELECTRONIC WORKPIECE

Docket No. : 291958025US6

**PRIOR APPLICATION**

Application No. : 09/386,610

Filing Date : August 31, 1999

Examiner : Erica Smith-Hicks

Art Unit : 1741

Box Patent Application  
Commissioner for Patents  
Washington, DC 20231

**PRELIMINARY AMENDMENT**

Dear Commissioner:

Please amend the subject application as follows:

**In the Title:**

Please change the title to:

METHODS AND APPARATUS FOR PROCESSING THE SURFACE OF A  
MICROELECTRONIC WORKPIECE

**In the Specification:**

On page 1, line 5, please delete the "CROSS-REFERENCE TO RELATED  
APPLICATIONS" and insert the following:

## CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. Patent Application No. 09/386,610, filed August 31, 1999, and issued on October 30, 2001, as U.S. Patent No. 6309524; which is a continuation of International PCT Patent Application No. PCT/US99/15847, filed in the English language on July 12, 1999; which claims priority from U.S. Patent Application Serial No. 09/113,723, filed July 10, 1998, U.S. Provisional Application Serial No. 60/111,232, filed December 7, 1998, and U.S. Provisional Application Serial No. 60/119,668, filed February 11, 1999.

### In the Claims:

Please cancel claims 20-26, 41 and 42.

## REMARKS

Claims 1-19 and 27-40 are presently pending in the subject application. Claims 20-26, 41 and 42 have been cancelled. No new matter has been added by way of this amendment.

1. A reactor for plating a metal onto a surface of a workpiece comprising:  
a reactor bowl including an electroplating solution disposed therein;  
an anode disposed in the reactor bowl in contact with the electroplating solution;  
a contact assembly spaced from the anode within the reactor bowl the contact assembly including  
a plurality of contacts disposed to contact a peripheral edge of the surface of the workpiece, the plurality of contacts executing a wiping action against the surface of the workpiece as the workpiece is brought into engagement therewith, and  
a barrier disposed interior of the plurality of contacts and including a member disposed to engage the surface of the workpiece to effectively isolate the plurality of contacts from the electroplating solution.

2. A reactor as claimed in claim 1 wherein the plurality of contacts are in the form of discrete flexures.

3. A reactor as claimed in claim 1 wherein the plurality of contacts are in the form of a Belleville ring contact.

4. A reactor as claimed in claim 1 and further comprising a flow path disposed in the contact assembly for providing a purging gas to the plurality of contacts and the peripheral edge of the workpiece.

5. A reactor as claimed in claim 4 wherein the purging gas assists in effecting the barrier.

6. A reactor as claimed in claim 1 wherein the contact assembly comprises:

an outer body member formed from a dielectric material;

a contact support member facilitating support of the plurality of contacts, the contact support member being disposed radially interior of the outer body member and being formed from a conductive material.

7. A reactor as claimed in claim 6 wherein the contact support member and the plurality of contacts are comprised of platinized titanium.

8. A reactor as claimed in claim 6 wherein the plurality of contacts are in the form of discrete flexures, each of the discrete flexures being disposed in a corresponding flexure channel defined between the contact support member and outer body member.

9. A reactor as claimed in claim 8 and further comprising a wedge member disposed to engage a corresponding groove in the contact support member along with the discrete flexures to thereby secure the discrete flexures with the contact support member.

10. A reactor as claimed in claim 9 wherein at least a portion of the wedge member assists in stiffening the flexing of the flexure contacts as a workpiece is brought into engagement with the contact assembly.

11. A reactor as claimed in claim 6 wherein the plurality of contacts are in the form of a Belleville ring contact having a common portion disposed in a notch at an interior face of the contact support member.

12. A reactor as claimed in claim 6 and further comprising a workpiece guide disposed radially interior of the contact support member.

13. A reactor as claimed in claim 6 wherein the barrier comprises a lip formed integrally with the outer body member and disposed to engage the surface of the workpiece.

14. A reactor as claimed in claim 6 wherein the barrier comprises an elastomeric seal member supported by the outer body member, the elastomeric seal member engaging the surface of the workpiece.

15. A reactor as claimed in claim 1 wherein the contact assembly is attached to the reactor using at least one latching mechanism.

16. A reactor as claimed in claim 1 and further comprising a processing head including the contact assembly, the processing head including a stator portion and a rotor portion, the rotor portion comprising the contact assembly.

17. A reactor as claimed in claim 16 wherein the contact assembly is detachably connected to the rotor portion by at least one latching mechanism.

18. A reactor as claimed in claim 16 and further comprising a backing member and a drive mechanism, the backing member and contact assembly being moved

relative to one another by the drive mechanism between a workpiece loading state and a workpiece processing state, the workpiece being urged against the plurality of contacts of the contact assembly by the backing member in the workpiece processing state.

19. A reactor as claimed in claim 18 wherein the drive mechanism is substantially surrounded by a bellows member.

20. (Canceled)

21. (Canceled)

22. (Canceled)

23. (Canceled)

24. (Canceled)

25. (Canceled)

26. (Canceled)

27. A reactor as claimed in claim 26 wherein the workpiece support member is in the form of discrete flexures.

28. A reactor as claimed in claim 26 wherein the workpiece support member is in the form of a Belleville ring.

29. A reactor as claimed in claim 26 and further comprising a flow path disposed in the workpiece support assembly for providing a purging gas to the peripheral edge of the workpiece.

30. A reactor as claimed in claim 4 wherein the purging gas assists in effecting the barrier.

31. A reactor as claimed in claim 1 wherein the workpiece support assembly comprises:

an outer body member formed from a dielectric material;

a ring support member facilitating support of the workpiece support member, the ring support member being disposed radially interior of the outer body member and being formed from a dielectric material.

32. A reactor as claimed in claim 31 wherein the wafer support member is in the form of discrete flexures, each of the discrete flexures being disposed in a corresponding flexure channel defined between the ring support member and outer body member.

33. A reactor as claimed in claim 31 wherein the wafer support member is in the form of a Belleville ring contact having a common portion disposed in a notch at an interior face of the ring support member.

34. A reactor as claimed in claim 31 wherein the barrier comprises a lip formed integrally with the outer body member and disposed to engage the surface of the workpiece.

35. A reactor as claimed in claim 31 wherein the barrier comprises an elastomeric seal member supported by the outer body member, the elastomeric seal member engaging the surface of the workpiece.

36. A reactor as claimed in claim 26 wherein the workpiece support assembly is attached to the reactor using at least one latching mechanism.

37. A reactor as claimed in claim 26 and further comprising a processing head including the workpiece support assembly, the processing head including a stator portion and a rotor portion, the rotor portion comprising the workpiece support assembly.

38. A reactor as claimed in claim 37 wherein the contact assembly is detachably connected to the rotor portion by at least one latching mechanism.

39. A reactor as claimed in claim 37 and further comprising a backing member and a drive mechanism, the backing member and contact assembly being moved relative to one another by the drive mechanism between a workpiece loading state and a workpiece processing state, the workpiece being urged against the plurality of contacts of the contact assembly by the backing member in the workpiece processing state.

40. A reactor as claimed in claim 39 wherein the drive mechanism is substantially surrounded by a bellows member.

41. (Canceled)

42. (Canceled)

Please consider the application in light of the above amendments. The Examiner is encouraged to contact the undersigned at (206) 287-3258 if there are any questions regarding these amendments.

Respectfully submitted,

Perkins Coie LLP



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PTP:kje

Enclosures:

Appendix (Marked-up version of title and specification)

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**Appendix - Title**  
**Marked to Show Changes**

METHODS AND APPARATUS FOR ~~COPPER PLATING USING~~  
~~ELECTROLESS PLATING AND ELECTROPLATING~~ PROCESSING THE SURFACE  
OF A MICROELECTRONIC WORKPIECE

**Appendix – Specification  
Marked to Show Changes**

**CROSS REFERENCE TO RELATED APPLICATIONS**

This application is a continuation of U.S. Patent Application No. 09/386,610, filed August 31, 1999, and issued on October 30, 2001, as U.S. Patent No. 6309524; which is a continuation of International PCT Patent Application No. PCT/US99/15847, ~~designating the U.S., filed in the English language on July 12, 1999, entitled METHOD AND APPARATUS FOR COPPER PLATING USING ELECTROLESS PLATING;~~ which claims priority from U.S. Patent Application Serial No. 09/113,723, filed July 10, 1998, U.S. ~~Patent~~ Provisional Application Serial No. 60/111,232, filed December 7, 1998, and U.S. ~~Patent~~ Provisional Application Serial No. 60/119,668, filed February 11, 1999.